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Sustainability Level of Agropolitan Region Development of Karacak in Bogor Regency

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Abstract

The plantation sector is one of the strategic sub-sectors that concern of natural resource management activities, human resources, production facilities, tools and machinery, cultivation, harvesting, processing, and marketing related to plantation crops. The purpose of this research is to know the level of sustainability of the development of the Karacak agropolitan area of Bogor Regency. Methods of data analysis used was with MDS-RapAgro approach. The research results obtained that the level of sustainability of the development of the Karacak agropolitan area of Bogor Regency was generally categorized as less sustainable, consist of; environmental aspects (43.35%), economic aspects (48.78%), social aspects (49.96%), technology and infrastructure aspects (34.12%), and policy aspects (22.31%).

Keywords: Sustainability; region development; Karacak; agropolitan.

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1. Introduction

Plantation activities will provide benefits, both in terms of economic, ecological and social, as well as the concept of sustainable development. One of the programs developed to support the increase in national plantation production is the agropolitan program. The agropolitan concept is contained in the Agropolitan Regional Development Master Plan of the Ministry of Settlements and Regional Infrastructure that establishes agropolitan centers, regional units, superior commodities, infrastructure support and institutional support. In the master plan, the determination of superior commodities must meet the criteria of superior commodities supported by the downstream, agribusiness activities that involve many actors and communities (local wisdom) and have a large economic scale and are socially accepted by the community [1]. Further mentioned the need for agropolitan development; 1) Reducing the depletion of village wealth (production centers) to big cities; 2) Revive rural/populist economy by empowering the potential of villages so as to reduce dependence on big cities; 3) Reducing congestion/agglomeration of capital, industry, transportation, and others that damage the environment; 4) Agropolis is developed as a force capable of encouraging, defending and serving the growth area; 5) Developing agribusiness systems and businesses in a selected area in the framework of equitable development and its results.

The development of the agropolitan concept has also been carried out in many other countries, such as; Malaysia, Nepal and India. Agropolitan in general can be seen as an integrated system in certain agricultural production areas consisting of production centers equipped with semi-urban facilities such as irrigation, roads, sub-agribusiness sub-centers, micro-banks, clean water, etc. [2].

The importance of agropolitan programs including the development of Karacak agropolitan area, Bogor Regency, is expected to provide broad benefits (multiplayer effect), especially from the socio-economic aspects of the community and regional income (PAD). Thus, efforts to optimize the development of the Karacak agropolitan area of Bogor Regency, need to be carried out continuously in order to improve the living standards of the farmers (planters) and increase local revenues from the plantation sub-sector. For this reason, various analyzes and evaluations of the Karacak agropolitan program in Bogor Regency need to be carried out so that they can be more optimal and can achieve the target as stated.

2. Material and Method

2.1. Types and Data Source

The types of data collected in this study include; primary data and secondary data. Primary data are data obtained directly in the field, especially those related to the development of the Karacakol Karacak area by conducting surveys and field observations. According to [3] that primary data is data obtained directly from the source and recorded for the first time. While secondary data is obtained through journals, service reports or related institutions, as well as internet searches. Furthermore [3] states that secondary data is the data collected by other people with their own intentions and has categorization or classification according to needs.

2.2. Data Analysis Method

The method of data analysis is adjusted to the purpose of the study, which is to know the level of sustainability of the development of the Karacak region, Bogor Regency. The method of data analysis uses a sustainability analysis approach namely the MDS method with the use of modified Rapfish software. MDS (Multi-Dimensional Scaling) analysis with the help of modified Rapfish software is an approach and tools used to determine the extent of the sustainability of the management of a program or study including the development program of Karacak's agropolitan area. MDS-Rapfish was first developed by [4]. This approach is based more on the principle of Multi Criteria Analysis (MCA) by relying on an algorithm called the MDS algorithm [5]. Multi Dimensional Scaling (MDS) is a statistical analysis technique that performs multidimensional transformations [6].

The assessment or scoring given to each attribute is analyzed multidimensionally to determine the sustainability position that is assessed relative to the two reference points, namely; good and bad. To facilitate visualization, ordination analysis is used. The ordination process uses Rapfish software [6]. Furthermore, it is stated that MDS can present the ordination method effectively. Observed objects or points are mapped into two or three dimensional spaces, so that the object or point is attempted as close as possible to the origin. In other words, the same two points or objects are mapped to one point that is close to one another. Conversely, objects or points that are not the same are depicted with distant points [5]. Furthermore, it is also stated that the ordination technique by configuring the distance between points in t-dimensions refers to the euclidean distance between points. The position of the points of sustainability visually will be very difficult to imagine considering the dimensions are very many. Therefore, to facilitate the visualization of this position, ordination analysis using multi-dimensional scaling (MDS) method is used, before MDS is performed, all data is standardized, ie normalization of all attributes. Through this ordination system, the position of the effectiveness point can be visualized in two axes (vertical and horizontal). Through the rotation method of the axis, the position of these points can be projected on a horizontal line where the extreme point of "bad" is given a score of 0% and the extreme point of "good" is given a score of 100%. The position or position of sustainability to be studied is between the two extreme points and the sustainability index can be analyzed by looking at the percentage value on the horizontal line, with reference to the sustainability value set by [4]. Sustainability analysis in this research is intended to obtain an overview of the level of sustainability of the development of the Karacak region of Karacak, Bogor Regency. The following are the operational stages of sustainability analysis using Rapfish software, and referring to [7] as follows:

- Determine the theme / topic of the study, namely the sustainability of the development of the Karacak agropolitan area of Bogor Regency.
- Determine aspects of the study, including; environmental, economic, social, technology and infrastructure aspects, policy aspects.
- Determine the attributes of each aspect of the study, including; environmental aspects (8 attributes), economic aspects (8 attributes), social aspects (8 attributes), technology and infrastructure aspects (8 attributes) and policy aspects (8 attributes).
- Give a bad-good score on each attribute.
- Enter the score of the assessment results of each attribute into the Rapfish software.
- Run Rapfish software.

- Bring up rap analysis (ordination of sustainability). Rap analysis is intended to determine the percentage of sustainability from each aspect of the study.
- Run leveraging to obtain leverage of attributes, which is the determination of lever attributes from every aspect of the study. The lever attribute is an attribute whose presence is sensitive to the increase or decrease in the sustainability status, the greater the RMS value, the greater the role of the attribute to the sustainability sensitivity [6].
- Run Monte Carlo with a 95% confidence interval. The Monte Carlo analysis is intended to see the effect of errors, in an effort to increase confidence in the analysis output. The difference or difference between the Monte Carlo value and the ordination value (percentage of sustainability), indicates that the impact of the scoring error is relatively small. If the difference value of the two analyzes (Monte Carlo Analysis and Rap Analysis) >5% then the results of the analysis are not adequate as an estimator of sustainability index.
- Bring up the squared correlation (R^2) value as an assessment of the goodness of fit. Squared correlation (R^2) is the square of the correlation coefficient which shows the proportion of variants of the optimally scaled data, which are contributed by multidimensional scaling procedures which are a measure of goodness of fit measure. R^2 values indicate the amount/variance of data that can be explained in the model. Squared correlation value is used to determine the closeness between data and perceptual map whether the data is mapped or not. R^2 value closer to 1 means that the data is mapped perfectly or in other words the higher the R^2 value, the better the model is in explaining the data variance. [8] states that the value of R^2> 80% indicates that the estimation model of the sustainability index is good and adequate to use.
- Bring up the stress values to indicate indications of incompatibility or incompatibility (a lack of fit measure). Stress value is the inverse of the R^2 value. Stress value is used to see whether the results are close to the actual state or not.
- The closer to zero (0), the output produced is more similar to the actual situation. The lower the stress value, the better / fit the model. Conversely, the higher the stress value, the less suitable the model is. The stress value that can be tolerated is <20% [6].
- Bring up the Root Mean Square (RMS) value of each attribute. The greater the RMS value, the greater the role of the attribute to the sustainability sensitivity [6].
- Make a kite diagram of the value of each aspect of the study of the development of the Karacak region. The diagrams are useful as a visualization of the sustainability trade-off.

Table 1: Sustainability index category

Index	Categories
0 – 25	Bad; Not sustainable
26 – 50	Less; Less sustainable
51 – 75	Enough; Sufficiently sustainable
76 – 100	Good; Very sustainable

Sources: [4]

3. Result and Discussions

The results of the analysis of the sustainability of the development of the Karacak agropolitan area of Bogor Regency are evaluated based on 5 (five) aspects, including; environmental, economic, social, technology and infrastructure aspects as well as policy aspects, obtained as follows:

Tabel 2: The results of the analysis of the sustainability of the development of Karacak's agropolitan area

Aspects	Sustainability index (%)	Value of Monte Carlo (%)	Value of R^2 (%)	Value of Stress (%)	Category
Environmental	43.35	43.55	94.53	15.33	Less sustainable
Economy	48.78	48.62	94.62	15.23	Less sustainable
Social	49.96	49.84	94.47	13.85	Less sustainable
Technology and Infrastructure	34.12	34.76	94.93	14.18	Less sustainable
Policy	22.31	23.15	95.26	13.86	Not sustainable

The results show that the sustainability of the development of the Karacak agropolitan area of Bogor Regency is categorized as not/less sustainable with a sustainability index value ranging from 22.31 to 49.96%. These results can be accepted keeping in mind the results of the validation test obtained the difference between Monte Carlo values and the sustainability index (ordination values) ranging from 0.12-0.84% or <1%. [8] states that the difference between the value of monte carlo and the ordination value is a maximum of 5%. This value indicates that the effect of the error or the impact of the error in the scoring is relatively very small. Thus, the RapAgro model developed is considered adequate as a predictor of the sustainability index value. According to [6] that Monte Carlo analysis can be used as a simulation method to evaluate the impact of random errors in statistical analysis. The same thing was stated by [5] that Monte Carlo analysis can be an indicator of errors caused by scoring on each attribute. variation in scoring that is multidimensional due to different opinions, data analysis processes that are carried out repeatedly, and errors in inputting data or missing data.

Rsquare (Squared Correlation) or also known as the coefficient of determination is the square of the correlation coefficient which shows variant proportions of the optimization of data scaling contributed by multidimensional scaling procedures and is a measure of goodness of fit measurement. According to [9] that the coefficient of determination or R^2 essentially measures how far the ability of a model can explain the variation of the dependent variable (dependent variable). R^2 values range between 0 (zero) and 1 (one) which if expressed in percentages between 0% to 100%. A small R^2 value means that it has a very limited dependent variation and the R^2 value close to 1 means that the independent variables can provide all the information needed to predict the dependent variable. In other words, that the value close to 1 indicates that the model can be explained well from the existing data or the R-square value closer to 1 means that the data is increasingly mapped perfectly. The results of the analysis obtained R^2 values obtained ranged from 94.47 to 95.26% which indicates that this value

is quite high, namely> 80%. [8] states that Squared Correlation (R^2) values of more than 80% indicate that the sustainability index estimation model is good and adequate to use.

Stress value is a measure of incompatibility (a lack of fit measurement) between the data and the measurement results or models produced.

The smaller the stress value shows that the monotonous relationship that is formed between inequality and disparity is better and the map configuration criteria that are formed are more perfect. In other words, stress values are close to zero, so the output produced is more similar to the actual situation or the lower the stress value, the better / fit the model.

Conversely, the higher the stress value, the less suitable the model is. The results of the analysis on stress values ranged from 13.85-15.33% which indicates that the criteria for nonconformity are categorized as quite appropriate. [8] states that the value of stress that can be tolerated is <20%.

Based on the three output validation criteria obtained from the analysis results, it can be concluded that the resulting model is valid and adequate to be used as an estimator. Difference in value of monte carlo with the value of sustainability for all aspects of the study <5%. Similarly, the value of R^2 is all> 80%. and stress value <20%.

3.1. Environmental Sustainability

Environmental sustainability is a depiction of the level of sustainability of management related to environmental aspects (ecology) in the development of Karacak's agropolitan area. Environmental aspects consist of 8 (eight) study attributes, namely; a) the level of damage to mangosteen cultivation.

b) the level of climate influence on mangosteen productivity. c) the level of use of chemical fertilizers and chemical pesticides in the cultivation of mangosteen. d) the level of land conversion in the area of Agropolitan Karacak.

e) ratio of land use for mangosteen compared to other commodities. f) land conservation activities in the agropolitan karacak area. g) the level of utilization of mangosteen peel waste as mangosteen-based agroindustry/SMEs raw materials (zero waste) and h) the suitability of land for mangosteen plants. The ordination chart of environmental aspects sustainability is more detailed as follows

The results of environmental sustainability analysis obtained an ordination value of 43.35% or categorized as less sustainable. This shows that the management of environmental aspects is categorized as not yet sustainable. This can occur, due to the lack of a well-integrated environmental management concept.

The results of the leverage analysis of environmental aspects obtained that the leverage attributes of sustainability are the level of utilization of mangosteen peel waste as mangosteen-based agroindustry/SMEs raw materials. Mangosteen rind extract (*Garcinia mangos*tana L.) has been shown to have various pharmacological

activities. The results of ethanol extract of mangosteen pericarp (*Garcinia mangostana* L.) positively contain flavonoid, saponin, alkaloid, triterpenoid, tannin, and polyphenol compounds [10]. Several studies have proven the pharmacological activity of compounds contained in mangosteen rind, including as antioxidants, anticancer, anti-inflammatory, allergic, antibacterial, antifungal, antiviral, and antimalarial [11].

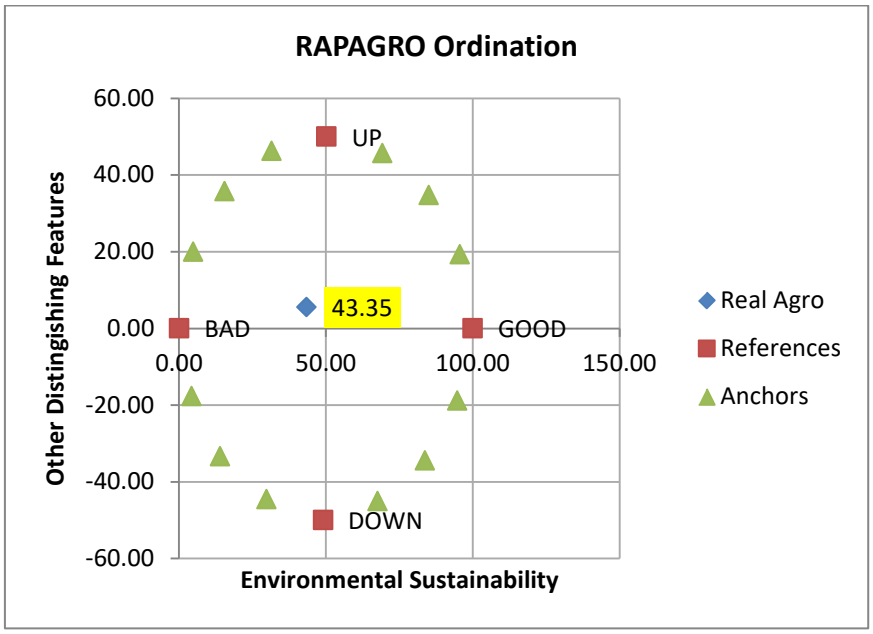

Figure 1: Environmental sustainability ordination

3.2. Economic Sustainability

Economic sustainability is a depiction of the level of sustainability related to the economic aspects of the development of the Karacak region. Economic dimension, consisting of 8 (eight) study attributes, namely; a) availability of mangosteen supply for mangosteen agro-industry or mangosteen processing area, b) the economic level of mangosteen-based agroindustry, c) market availability for mangosteen-based agro-industrial products. d) investment costs for mangosteen-based agroindustry, e) the level of availability of mangosteen raw materials which has the source of excess fresh mangosteen exports which can be used for agro-industrial raw materials. f) the level of influence of current technology utilization on the added value of mangosteen-based agroindustry products, g) access to capital for mangosteen farmers and entrepreneurs, and h) multiplayer effect of economy for the surrounding community. The ordination chart of economic aspects sustainability, in more detail as follows

The results of the economic sustainability analysis obtained an ordination value of 48.78% or categorized as less sustainable. This shows that the economic dimension has not shown sustainability related to the development of Karacak's agropolitan area. This can happen, because there is no overall concept of economic development and so far it is only on farm. While off-farm activities such as the development of agro-industry have not yet been carried out.

The results of leverage analysis of economic aspects obtained that there are 3 (three) attributes that become levers of sustainability, namely; a) investment costs for mangosteen-based agro-industries, b) market availability for mangosteen-based agro-industrial products / processed SMEs, and c) level of availability of mangosteen raw materials which are sourced from excess exports of fresh mangosteen which can be used for agro-industrial raw materials. These three attributes are attributes that have the highest root mean square RMS. Kavanagh and Pitcher (2004) state that the RMS value shows the magnitude of the role of each attribute to the sensitivity of the sustainability status.

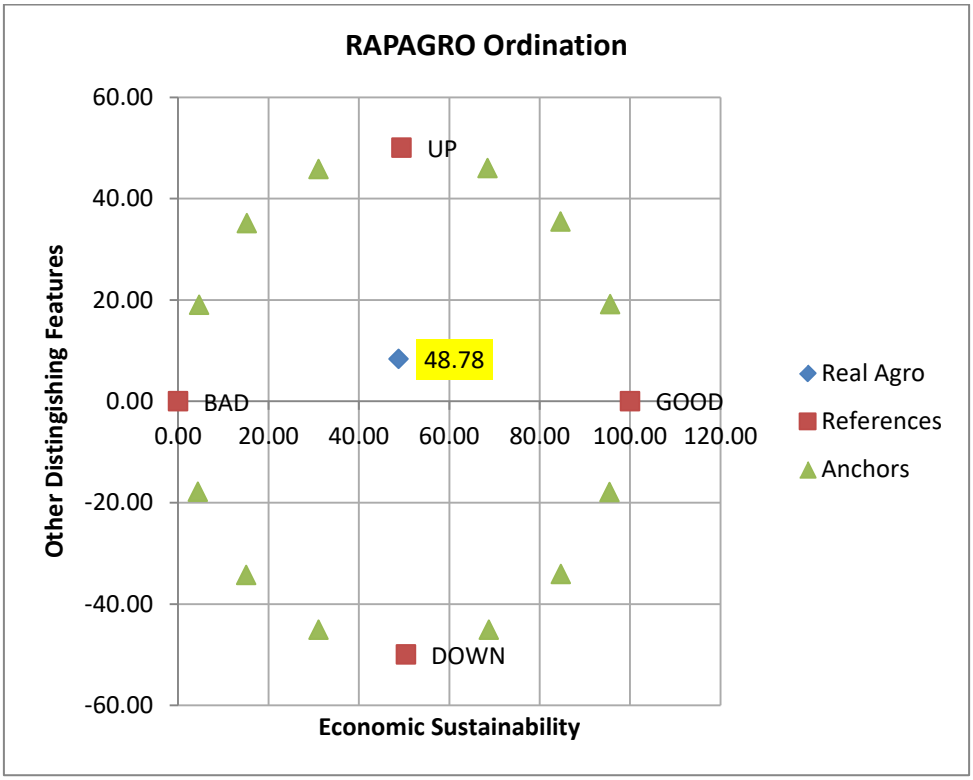

Figure 2: Economic sustainability ordination

Investment costs are financing items that relate to sources in the long run to generate profits in the future [12]. Medium according to [13] investment costs are defined as investment or ownership of sources in the long term that will be useful in some future accounting periods. According to [14] investment is defined as the placement of a number of funds at this time in the hope of obtaining profits in the future, the development of mangosteen agroindustry in the Karacak area of agropolitan is classified as investment in real assets such as; mangosteen processing plants and mangosteen peel. Investment costs are closely related to the amount of capital / investment that must be invested. Generally a large amount of capital or investment will require a valid appraisal, so it generally takes a long time in the grower.

3.3. Social Sustainability

Social sustainability is a depiction of the level of sustainability of social aspects in the development of Karacak's agropolitan area. The social dimension consists of 8 (eight) attributes of the study, namely; a) The rate of

population growth in the agropolitan area and its surroundings. b) Conflict of land use in the agropolitan area. c) The level of absorption of local labor. d) The level of influence of the development of the agropolitan area on access to education and health. e) The level of community participation in the development of the agropolitan area. f) The level of influence of the development of the agropolitan area on socio-culture (the order of life). g) The level of influence of agropolitan development on the convenience of living in and around the area and h) The level of influence of agropolitan development on the motivation and ethos of regional communities. The ordination chart of social aspects sustainability, more detailed as follows:

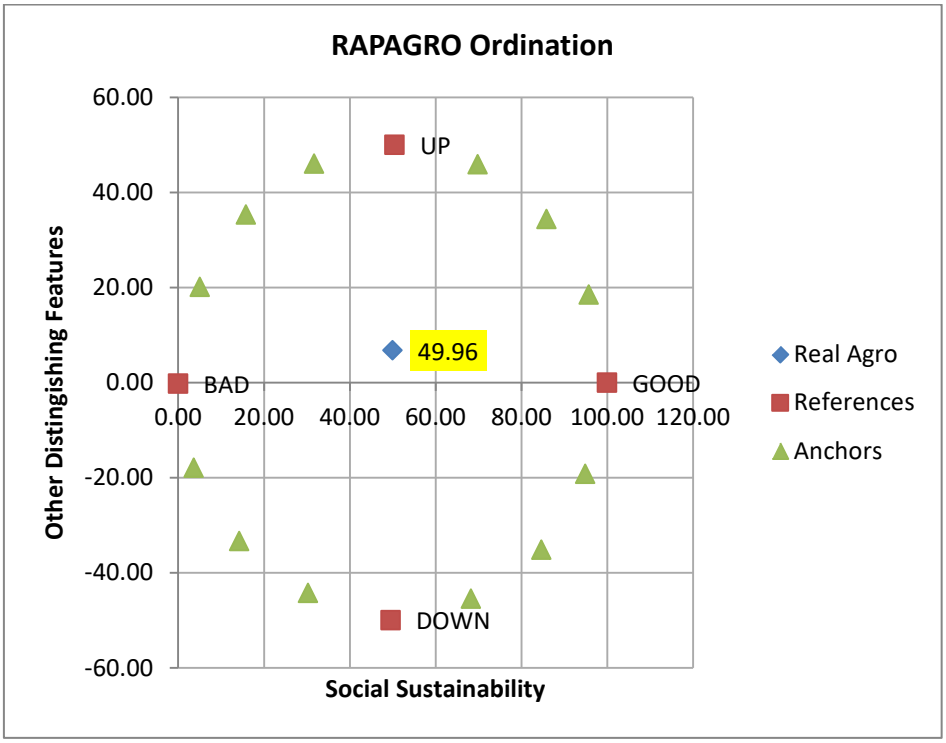

Figure 3: Social sustainability ordination

The results of the social sustainability analysis obtained an ordination value of 49.96% or categorized as less sustainable. This shows that the social dimension has not shown sustainability related to the development of Karacak's agropolitan area. This can happen, due to the lack of a comprehensive concept of developing social aspects and so far is still voluntary, such as the absence of comprehensive community empowerment concepts ranging from seed farmers, cultivators, collectors, processors and marketing.

The results of leverage analysis of social aspects obtained that there are 3 (three) attributes that become levers of sustainability, namely; a) the level of influence of regional development on access to education and health, b) the level of community participation in the development of agropolitan areas, and c) conflicts over land use in the agropolitan area. These three attributes are attributes that have the highest RMS value. [6] state that the RMS value shows the magnitude of the role of each attribute to the sensitivity of the sustainability status.

The level of influence of regional development on access to education and health is very important in ensuring the sustainability of social aspects. The availability and ease of access to education and health are important in

regional development. An area that has good accessibility to education and health will have a high level of social sustainability. This is because the aspects of education and health are the two main basic needs in the human development index. [15] stated that HDI is used to classify whether a country is a developed country, developing country or a backward country and also to measure the influence of economic policy on quality of life.

3.4. Technology and Infrastructure Sustainability

The sustainability of technology and infrastructure is a depiction of the level of sustainability related to technology and infrastructure aspects in the development of Karacak's agropolitan area. The technology and infrastructure dimensions consist of 8 (eight) study attributes, including; a) Conditions of road infrastructure and other facilities, b) Level of technology application in agropolitan development, c) Availability of mangosteen-based agro-industry / production technology (processing), d) Ease of access of regional communities to production technology, e) Availability of supporting infrastructure in development agroindustry/SMEs, f) Level of utilization of environmentally friendly technology, g) Application of Mangosteen cultivation technology and h) Ease of access to information and communication. The ordination chart of technology and infrastructure sustainability, is more detailed as follows:

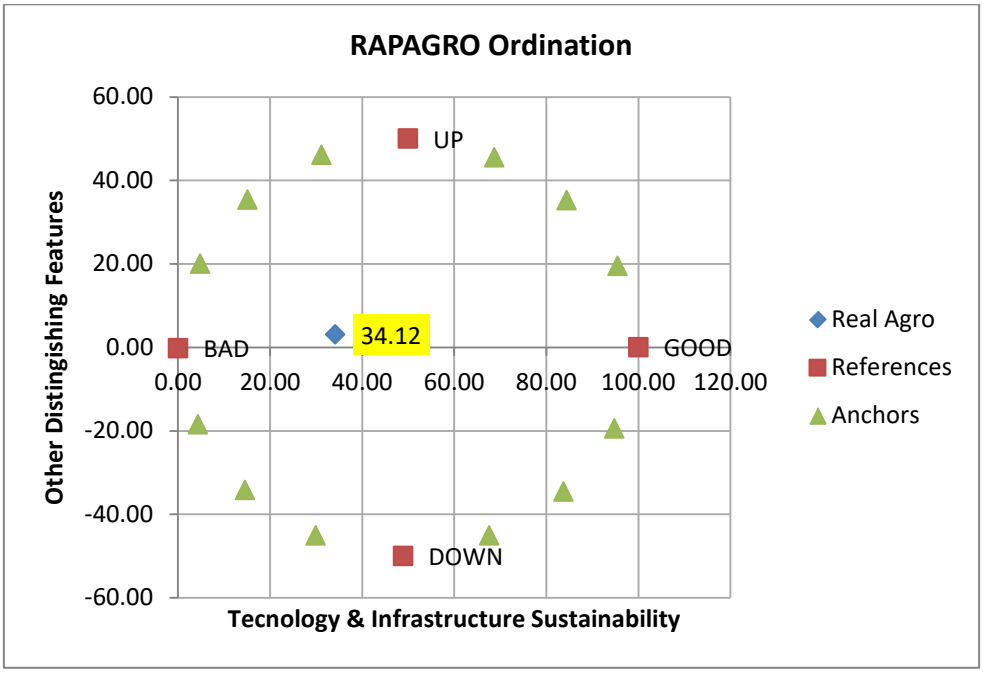

Figure 4: Technology and infrastructure sustainability ordination

The results of the technology and infrastructure sustainability analysis obtained 34.12% ordination value or categorized as less sustainable. This shows that the aspects of technology and infrastructure have not shown sustainability in relation to the development of Karacak's agropolitan area. This can happen, because there is no concept of industrial development, especially processing of results. Currently only mangosteen cultivation activities and several other types of commodities, as well as the absence of processing industry activities. On the

other hand industrial support infrastructure is also not yet available.

The results of leverage analysis of technology and infrastructure aspects obtained that there are 2 (two) attributes that become levers of sustainability. namely; a) availability of supporting infrastructure in the development of agro-industry/SMEs (RMS = 7.11%), and b) the level of utilization of environmentally friendly technology (RMS = 4.65%). Reference [6] state that the RMS value shows the magnitude of the role of each attribute to the sensitivity of the sustainability status.

The infrastructure plays an important role in enhancing economic growth where higher economic growth is found in regions with sufficient levels of infrastructure available.

Reference [16] research results using panel data from 26 provinces shows that physical capital, road infrastructure, telephone, health, and education have a positive influence on the economic output. Meanwhile, [17] concluded that electricity, road length, capital stock, and regional authority have a positive influence on the economic development of the West Indonesia Region.

The same thing in the research of [18] concludes that Indonesia's economic growth is influenced by the availability of infrastructure, including electrification, paved roads, and clean water. The results research of [19] show that the overall impact of the development of agropolitan infrastructure models on the five subsystems of agribusiness implies three aspects of a sustainable development system, namely social aspects, economic aspects and environmental aspects.

3.5. Policy Sustainability

Policy sustainability is a depiction of the level of sustainability related to policy aspects in the development of Karacak's agropolitan area.

The policy dimension consists of 8 (eight) study attributes, including; a) Realization of the agropolitan area development target. b) Availability of legal umbrella in the management and development of agropolitan areas. c) Availability of strategic policies at the district/provincial and central levels. d) Policy on incentives and disincentives in the development of agro-industry-based agropolitan areas based on regional superior commodities (Mangosteen).

e) Policy for setting Mangosteen commodity prices that support the development of mangosteen agro-industry /SMEs-based areas. f) Mangosteen business ease policy. g) Availability and existence of institutions at the farmer level (Poktan) and h) Availability of institutions and supporting facilities for agropolitan areas based on agro-industry at the District/Provincial Level. The ordination chart of the sustainability of policy aspects, more detailed as follows

The results of policy sustainability analysis obtained ordination value of 22.31% or categorized as not sustainbale. This shows that the policy aspect is the weakest aspect in the study of the sustainability of the development of Karacak's agropolitan area. This shows that the main problem faced at this time is the

conception or policy aspect of developing the Karacak region. This is evident since the region was proclaimed to be an agropolitan area with only agricultural activities (on farm). while other activities including processing and other supporting industries are not yet available.

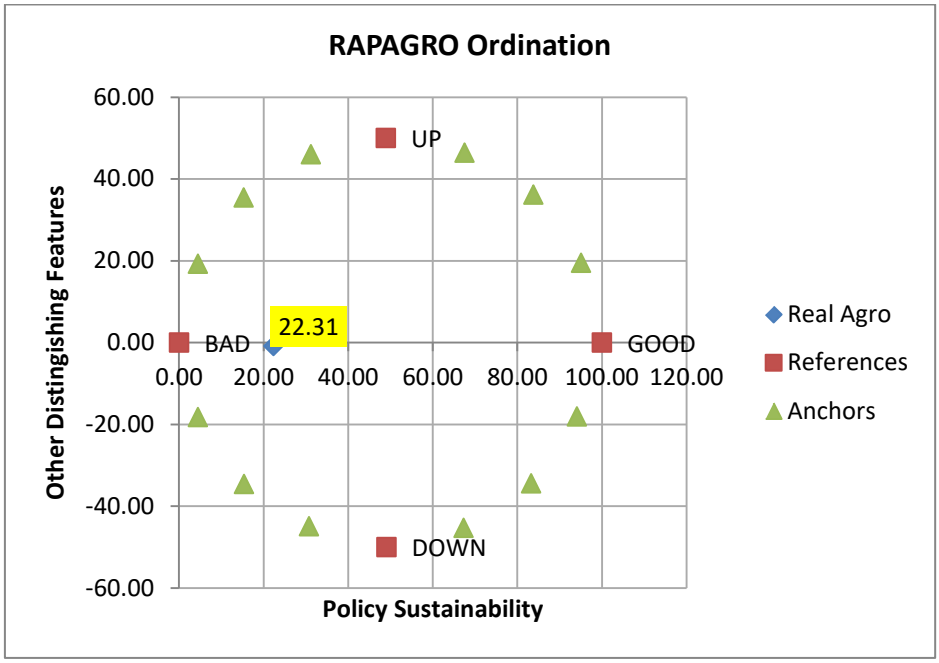

Figure 5: Policy sustainability ordination

The results of the leverage analysis of the policy aspects obtained that there are 3 (three) attributes that become levers of sustainability. namely; a) Mangosteen commodity pricing policies that support the development of agro-industry/SMEs-based areas (RMS=4.38%), b) availability of strategic policies at the district / province level (RMS=4.24%) and c) incentives and disincentives policies in developing agropolitan based areas agroindustry /SMEs (RMS=4.14%). Reference [6] state that the RMS value shows the magnitude of the role of each attribute to the sensitivity of the sustainability status.

According to [13] suggests that prices are an important part for buyers and sellers. Exchange of goods and services will only occur if the seller and buyer have agreed on the price. Price decisions will determine success or failure for the company. Prices are also considered very important in regulating the economy. Interest in prices has increased. Price is the basis for the formation of profits so that all companies try to maximize it with market development. Market demand is largely influenced by prices. Prices will provide a competitive position in the market. Meanwhile, according to [20] the price approach can be done in two directions, namely the approach from the producer where the price should not be lower than the average production cost. According to [13] that the purpose of pricing is, among others; a) Pricing to achieve income on investment, b) Pricing for price stability, c) Pricing to maintain or increase its share in the market, d) Pricing to deal with or prevent competition, and e) Pricing to maximize profits. Being according to [21] that the purpose of price setting includes; a). Profit orientation: achieving new targets, and increasing profits; and b) Sales orientation: increase sales volume, and maintain or develop market share. According to [22] the purpose of pricing is; a) Profit-

oriented, namely that each company always chooses the price that can produce the highest profit, b) Volume-oriented, namely a certain volume-oriented pricing, c) Oriented to image (image), that is, corporate image can be formed through price, Price stabilization is price fixing which aims to maintain a stable relationship between the price of the company and the price of the market leader, and e) Another goal is to set prices with the aim of preventing the entry of competitors, maintaining customer loyalty, supporting resale or avoiding interference. government.

3.6. Trade off of the Karacak Agropolitan Area Development

The sustainability of the development of the Karacak agropolitan area of Bogor Regency as a whole is categorized as not/less sustainable. Sustainability off trade shows that the policy aspect is an aspect that has the lowest sustainability level of 22.31% or categorized as not sustainability. While the other four aspects are categorized as less sustainable with the index ranging from 34.12 to 49.96%. Graphically is presented in the following figure:

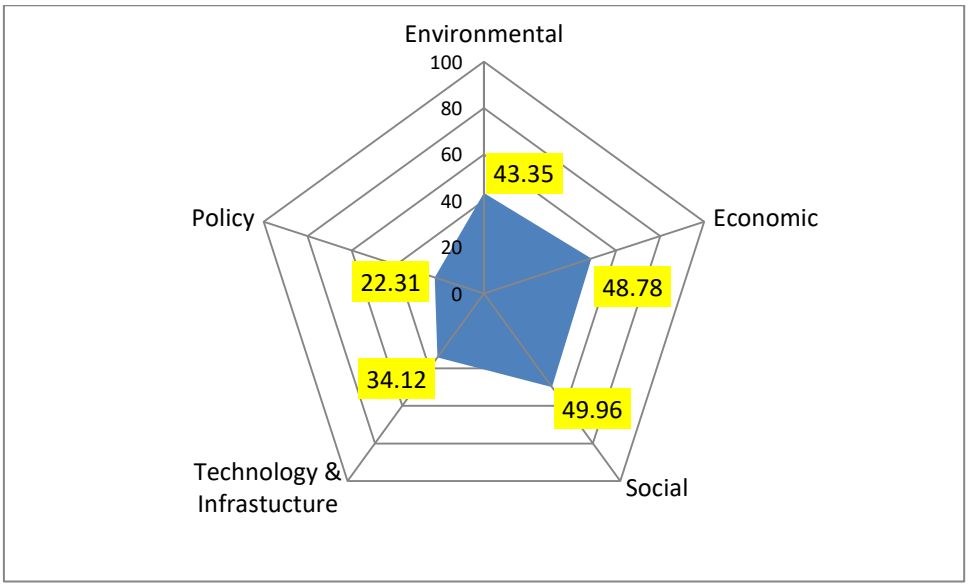

Figure 6: Trade off of the sustainability of Karacak's agropolitan area

Trade off conditions for the sustainability of agropolitan Karacak development, as shown in the picture above shows that all aspects need serious attention, starting from the aspects of policy, technology and infrastructure, environment, economy and social aspects.

The policy aspect becomes an aspect that needs to be the main concern in the sustainability of the development of Karacak's agropolitan area.

4. Conclusion

The level of sustainability of the development of the Karacak agropolitan area in Bogor Regency is generally categorized as less sustainable. All aspects of management are categorized as not / less sustainable. The lowest

level of sustainability is the policy aspects are 22.31% (not sustainable), technological and infrastructure aspects are 34.12% (less sustainable), environmental aspects are 43.35% (less sustainable), economic aspects are 48.78% (less sustainable), and social aspects are 49.96% (less sustianable). The attributes leverage of sustainability include; a) the level of utilization of mangosteen peel waste as mangosteen-based agroindustry/SMEs raw material, b) the investment costs of mangosteen-based agro-industry, c) market availability for agro-industrial products / mangosteen-based processed SMEs, d) the level of availability of mangosteen raw materials from sources of mangosteen exports fresh that can be used for agro-industry raw materials, e) the level of influence of regional development on access to education and health, f) the level of community participation in the development of agropolitan areas, g) conflict of land use in agropolitan areas, h) availability of supporting infrastructure in the development of agro-industry/SMEs , i) the level of utilization of environmentally friendly technology. Sustainability of policy aspects is categorized as less sustainable with the sustainability index, j) availability of strategic policies at the district/province level and k) incentives and disincentives policies in the development of agro-industrial/SMEs-based agropolitan areas.

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